Profile of South Puget Sound's Health

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Puget Sound Council

April 29, 2006

This presentation gives an overview of South Puget Sound's health, specifically the waters and watersheds of Nisqually, Henderson, Budd, Eld and Totten inlets. Much of the information comes from the 2006 *South Puget Sound Indicators Report* developed by staff from the Puget Sound Action Team and Thurston Regional Planning Council with assistance from other natural resource agencies. The report is available online at the websites for both the Action Team and Thurston Regional Planning Council.

South Sound has great value and meaning in our daily lives and in the history of the region. Some of the values of Sound Puget Sound include its:

- rich maritime heritage and culture;
- prized natural resources and habitats;
- ecosystem functions and services;
- and diverse economic values and uses.

Simply put, our marine waters and habitats are the defining features of South Puget Sound.

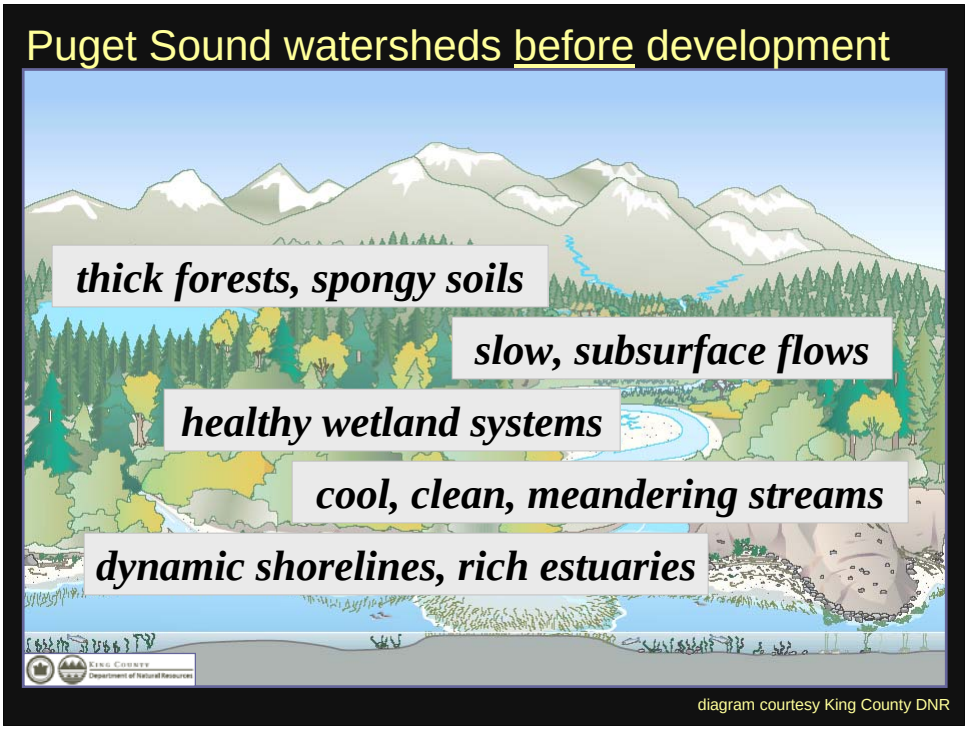
South Puget Sound is known for its great vistas and landscapes . . .

. . . and intricate network of bays and waterways . . .

. . . and rich resources that support a variety of activities, ranging from shipping and recreation to tourism and shellfish farming . . .

. . . but a healthy Puget Sound means more than a pretty view. It means productive habitats, a diverse food web, and unpolluted waters that help make it a vibrant ecosystem and the centerpiece of the South Puget Sound community and economy.

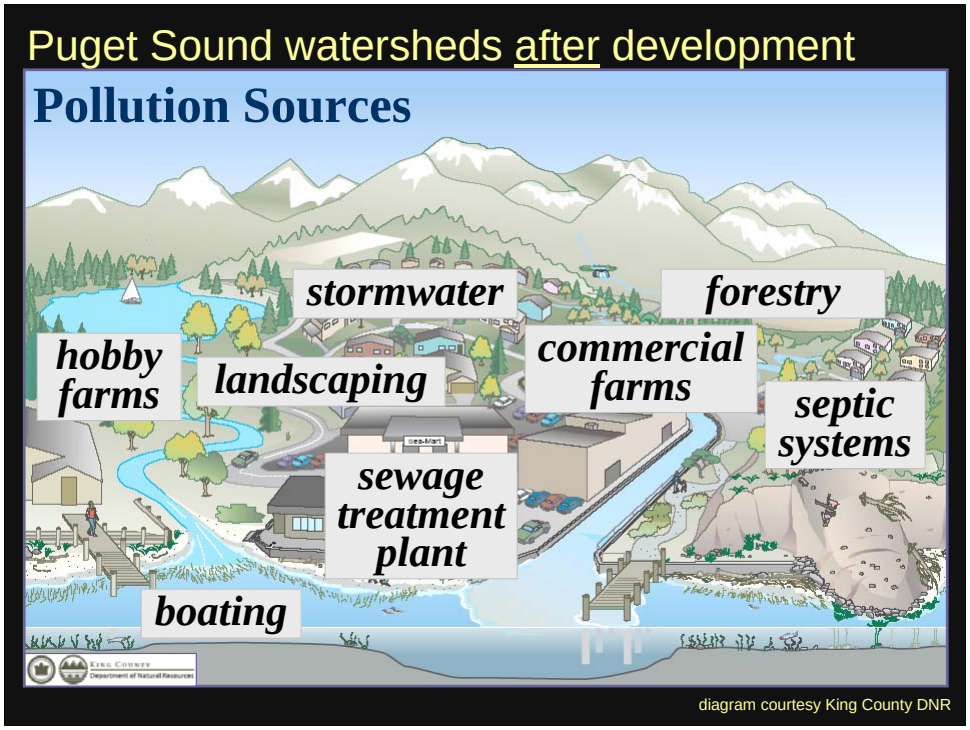
So we know that South Sound is beautiful and valuable, but what do we know about the current health of these waters and the adjacent watersheds?



Before looking at a few highlights from the indicators report, it's important to first understand how our lifestyles and development practices affect the condition of South Sound's waters and watersheds.

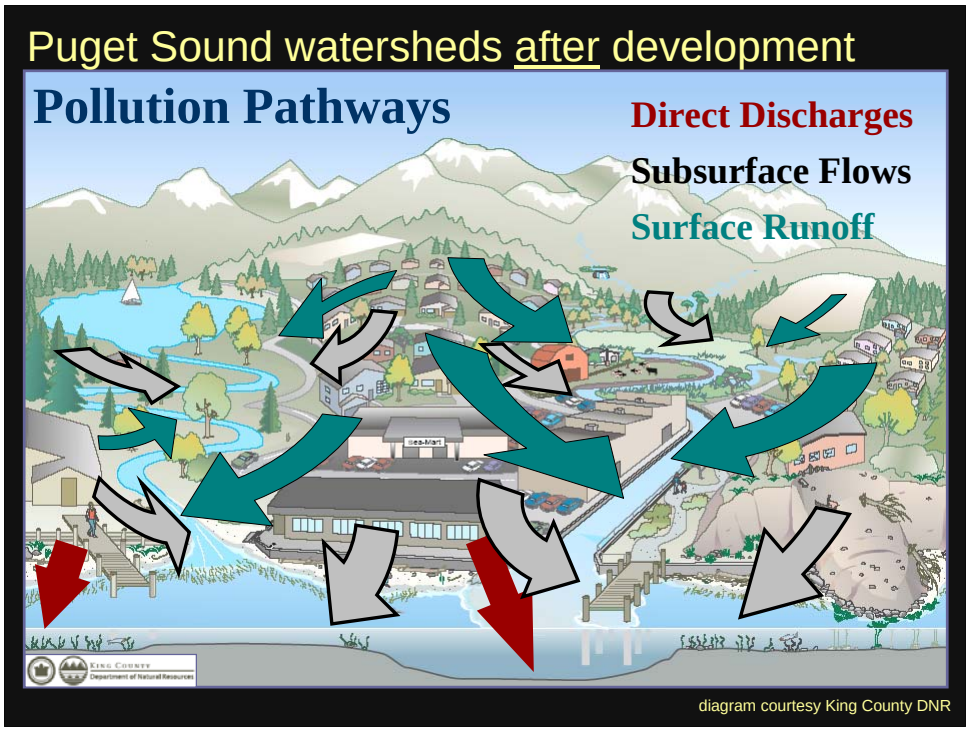
Here's a typical watershed in Puget Sound prior to development. Conditions are characterized by:

- thick forest cover and spongy soils;
- slow, subsurface flow of water with virtually no surface runoff;
- healthy wetland systems and other natural drainage features that help regulate flows and clean the water;
- cool, clean meandering streams that support healthy fish runs;
- and dynamic shorelines and rich estuaries that anchor the Sound's productive food web.

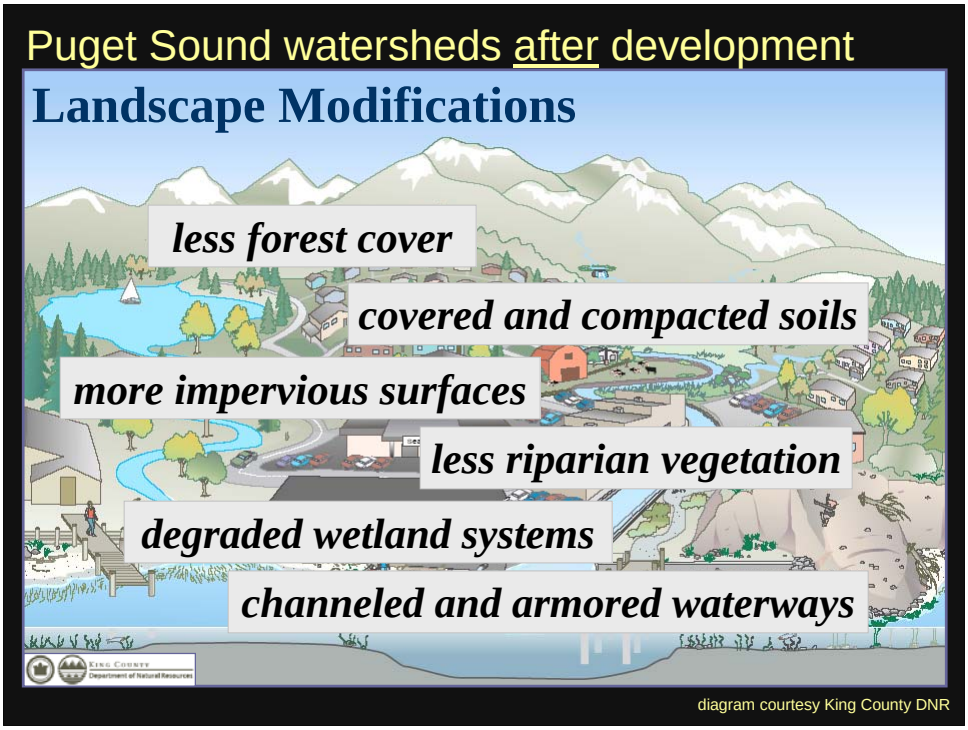


As development takes root and progresses over time, it changes and degrades the natural features and functions of the watershed and a variety impacts begin to emerge. We can look at these changes and impacts from at least three perspectives. First we'll look at the pollution sources.

Pollutants of all kinds – including toxics, pathogens and nutrients -- come from a variety of sources. These include septic systems, sewage treatment plants, stormwater runoff, forest practices, commercial farms, hobby farms, landscaping practices, boating and numerous other human and animal sources.



The pollutants reach our lakes, streams and inlets along three main pathways – as direct discharges, as subsurface flows, or as surface runoff. (Pollutants also reach surface waters via air transport and deposition.) The higher the level of development, the higher the percentage of water that is converted from slow, subsurface flow to surface runoff. Very often this is where the story ends and where our efforts focus, but it's important to understand that there's more to the story – that our habitat and water quality problems are not simply a pollution problem, but a landscape problem.

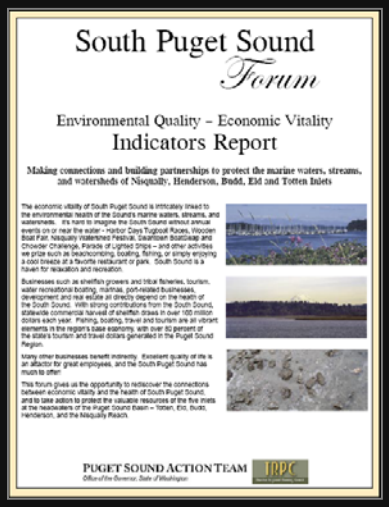


As we modify the landscape with development, we exacerbate the problems by allowing the efficient delivery of runoff and pollutants while simultaneously reducing the watershed's natural ability to regulate flows and break down pollutants. These changes include loss of forest cover, covered and compacted soils, increased impervious cover, loss of riparian vegetation, degraded wetland systems and channeled and armored waterways.

When you add it all together you begin to see the complexity of the challenges we face protecting and restoring our waters and watersheds. You also begin to better understand the fundamental point that healthy watersheds are the key to clean water and healthy aquatic habitats.

South Sound Indicators

- Population Growth
- Land Cover Change
- Shoreline Armoring
- Shellfish Water Quality
- Freshwater Quality
- Marine Water Quality


South Puget Sound
Forum

Environmental Quality – Economic Vitality
Indicators Report

Making connections and building partnerships to protect the marine waters, streams, and watersheds of Nisqually, Henderson, Budd, Eld and Totten Inlets

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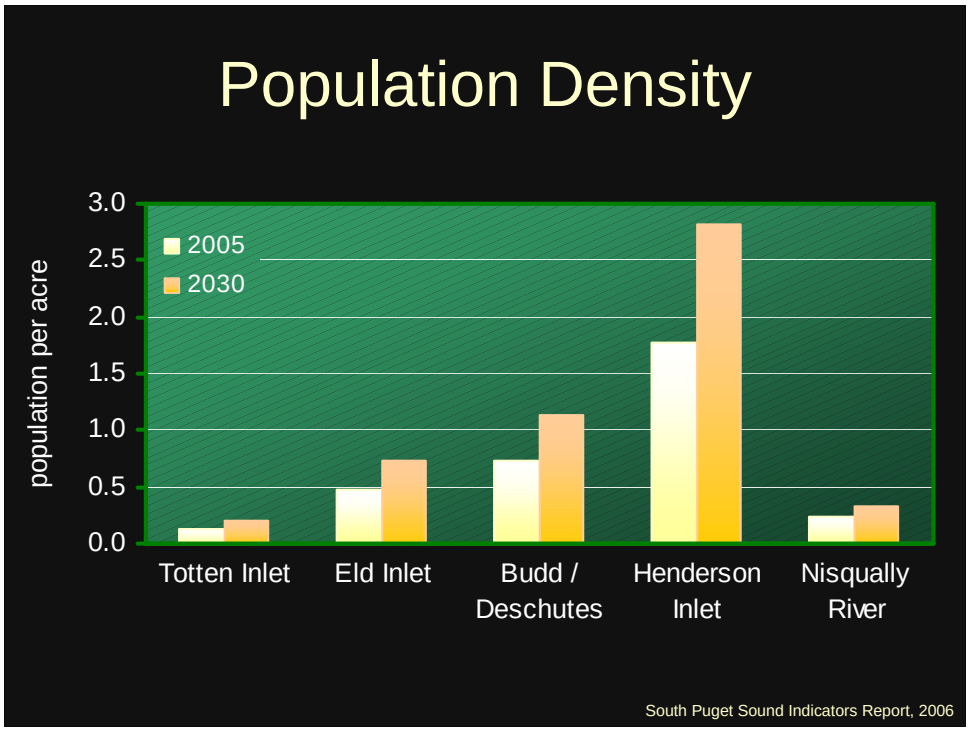
The *South Puget Sound Indicators Report* provides information on a suite of indicators that shed light on the health of South Puget Sound and the adjacent watersheds. These include population growth, land cover change, marine shoreline armoring, shellfish water quality, freshwater quality and marine water quality. The indicators not only give us a snapshot of where things stand today but also provide us with a baseline to guide future actions and to gauge changes over time. Here are a few highlights from the report.

Population growth is not an isolated phenomenon in the Puget Sound region. Coastal areas worldwide already have high concentrations of people and continue to experience high rates of growth.

Two-thirds of Washington State's population live in the Puget Sound region – already well over 4 million people and the number is expected to grow by another 1.4 million people in 20 years.

In Thurston County alone – not including the other South Sound counties – the population is currently about 225,000 people and is expected to rise by another 150,000 in 25 years. Compounding the problem is the fact that other measures of growth, such as the number of vehicles owned and operated in the area, are outpacing population growth.



This table shows population densities for the five South Sound watersheds in 2005 (the lighter bars on the left of each pair) and as projected to increase over the next 25 years. Remember that density is a function of both the number of people and the size of the watershed, so even though Budd/Deschutes has the highest population, Henderson Inlet has a much higher density due to the smaller size of the watershed. Another important aspect of this issue is that a large percentage of the population in these watersheds -- and all around Puget Sound for that matter -- lives in close proximity to the waters of South Puget Sound.

Land Cover Change

- Key indicator of stream health, other water resources.
- Forest cover decreasing.
- Impervious cover increasing.

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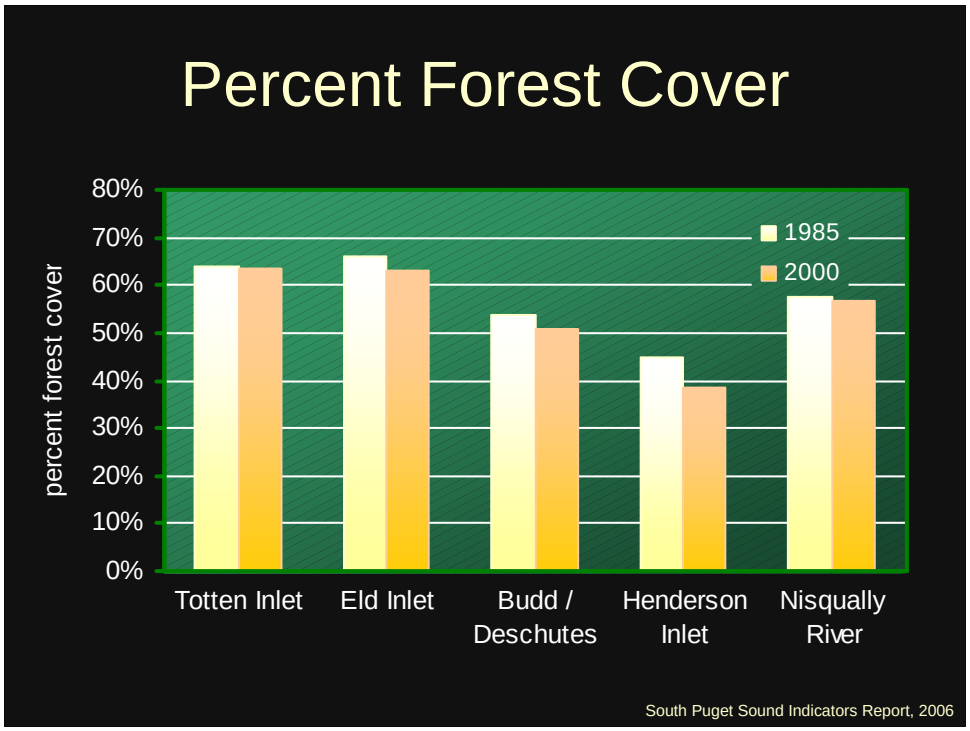
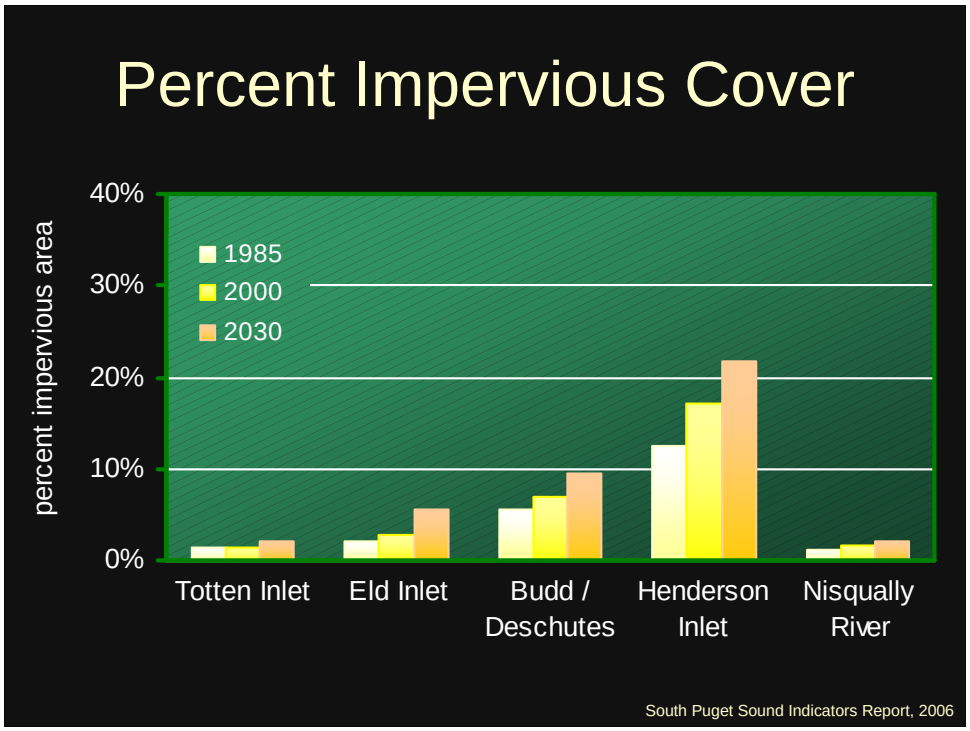
Regarding land cover, we now have an extensive body of research showing that land cover change – especially the conversion of forest land to development – correlates strongly with changes in the health of aquatic systems, especially stream systems. Two particularly telling indicators are forest cover and impervious cover. As forest cover decreases, and as impervious cover increases, stream health tends to decline. In all five watersheds these are the prevailing land cover trends – decreasing forest cover and increasing impervious cover attributed to urbanization.



This graph shows the change in forest cover in the five watersheds associated with urbanization between 1985 (the lighter bars on the left of each pair) and 2000. All of the watersheds show a decline, with the greatest changes occurring in the Henderson, Budd and Eld watersheds.



And this graph shows the companion indicator – percent impervious cover – in the five watersheds calculated for 1985 and 2000, and then estimated for 2030. As important as the percentages are, the amount and location of the impervious cover are also significant. For example, the percentage in the Nisqually watershed is very low due to its large area, but one part of the watershed where significant development is occurring and is expected to continue is the urban growth area of east Lacey that's located in the McAllister Creek sub-basin and that drains directly to the shellfish growing area of Nisqually Reach.

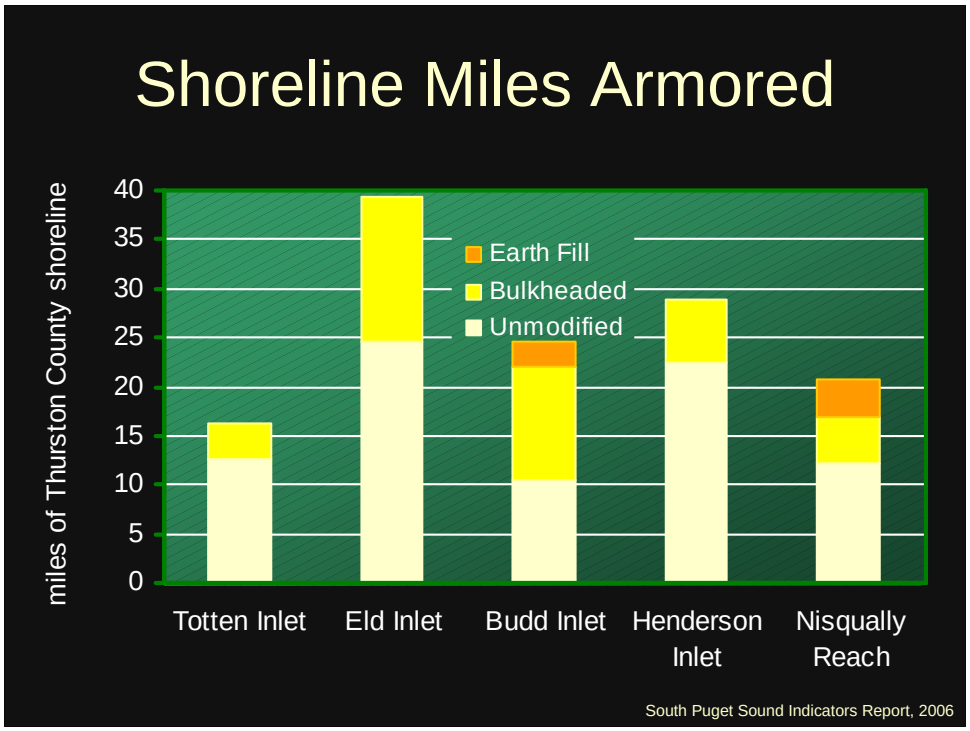
Shoreline Modification

- Armoring alters shoreline functions, processes.
- 37% of Thurston shoreline modified.
- Highest amounts in Budd and Eld inlets.

Hugh Shipman, Department of Ecology

Over time many South Sound shoreline areas have been altered with earth fill or different forms of bulkheading. Such activities directly affect a number of shoreline processes and functions and can damage essential beach habitat for sand lance and other forage fish that are a key food source for salmon at certain stages in their life cycles.

Approximately 37% (over 47 miles) of Thurston County's 130 miles of shoreline have been modified. Areas with high amounts of armoring include west Budd Inlet and Squaxin Passage, and areas with low amounts include Totten Inlet and west Henderson Inlet.



This graph shows the miles of marine shoreline in the five watersheds and the percentage modified by earth fill (the orange portion) and bulkheading (the yellow portion). The good news is that the rate of bulkheading has declined significantly in Thurston County over the past two decades, and progress is being made with alternative armoring techniques that are more natural and less damaging to the shoreline environment.

Shellfish Water Quality

- Very productive shellfish habitat.
- 4 of 5 inlets classified for harvest.
- Water quality tends to correlate with development levels.

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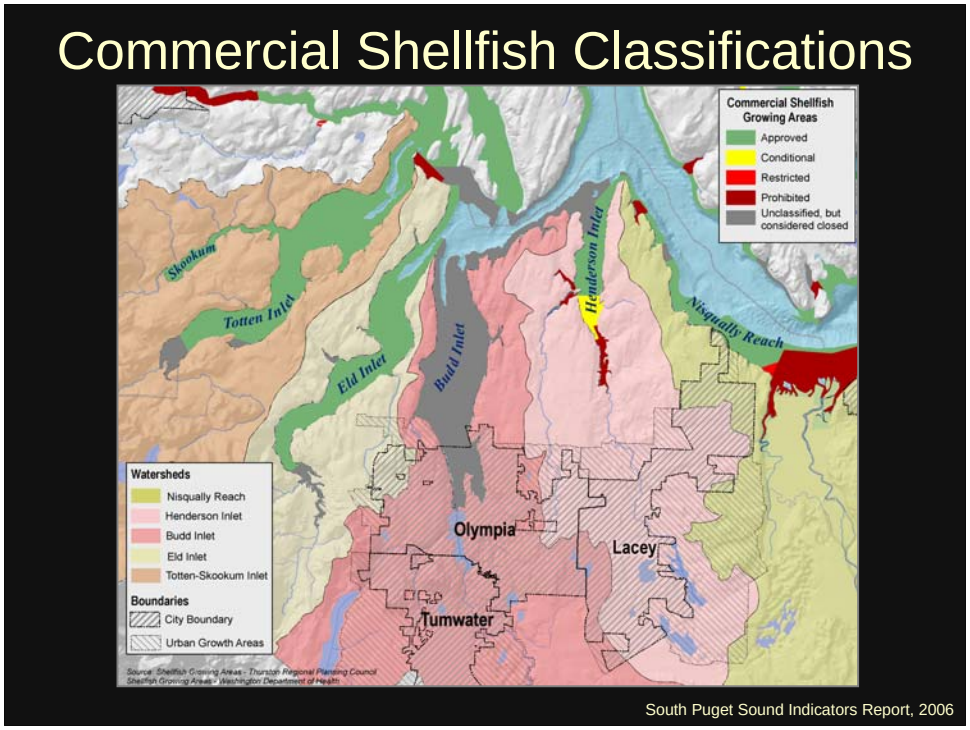
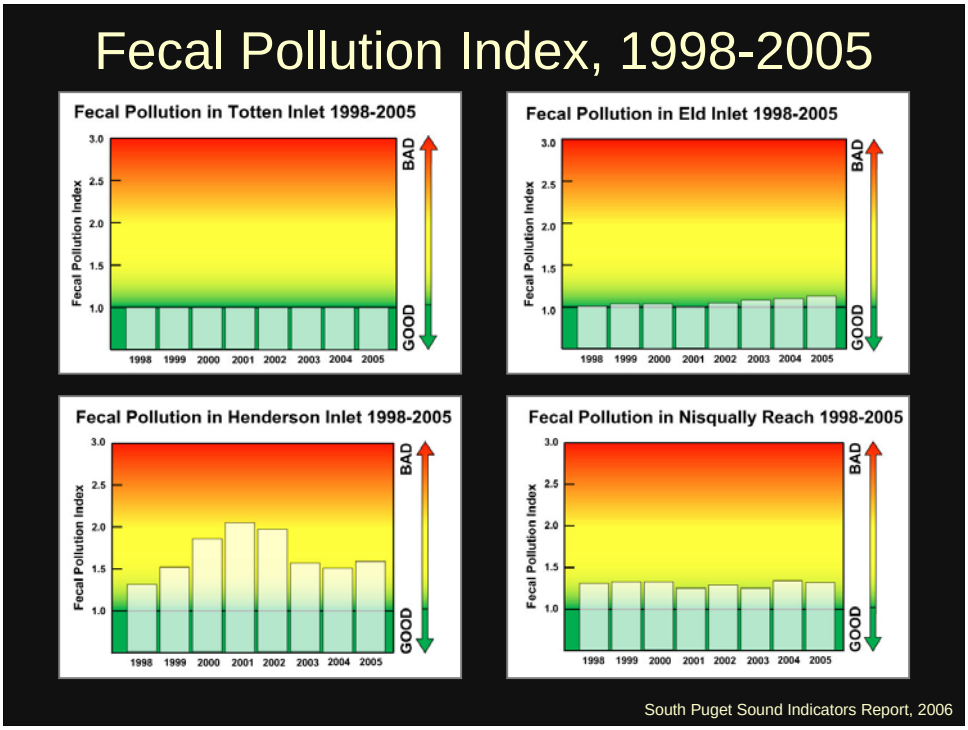
South Sound has some of the finest shellfish habitat in the world. The classification of marine waters for shellfish harvesting is based on measurements of fecal coliform bacteria and surveys of shoreline areas and drainages to identify potential pollution problems. Four of the five inlets are classified for commercial harvesting (Totten, Eld, Henderson, Nisqually) and the marine water quality in these areas correlates closely with development levels in the tributary watersheds.



This map shows the classification of the marine waters for shellfish harvesting and the boundaries of the tributary watersheds. The marine areas that are colored green are the areas that are approved year-round for harvest, which includes virtually all of Totten-Skookum inlets and Eld Inlet, and portions of Henderson Inlet and Nisqually Reach.



These four graphs show water quality scores for the four classified inlets between 1998 and 2005 using a “Fecal Pollution Index” developed by the Washington Department of Health based on measurements of fecal coliform bacteria in each of the inlets. The graphs illustrate the point that water quality tends to correlate with development levels in the different areas. Compare, for example, the series of perfect scores and the rural character of Totten Inlet (upper left) with the more volatile scores for Henderson Inlet and its more populated and urbanized watershed (lower left). In Eld Inlet (upper right) the important story is the gradual upward trend in the index that reflects increasing pollution in the marine waters. Extensive work in the early 1990s fixed many failing onsite sewage systems and improved animal keeping practices to restore shellfish harvesting in a closed portion of the inlet, but the focused efforts have waned in recent years. Such work must be sustained here and elsewhere around the Sound in order to ensure long-term protection of marine water and safe shellfish harvesting.

Freshwater Quality

- Stream conditions tend to mirror development levels.
- Problems surfacing in many areas.
- Tools include water cleanup plans.

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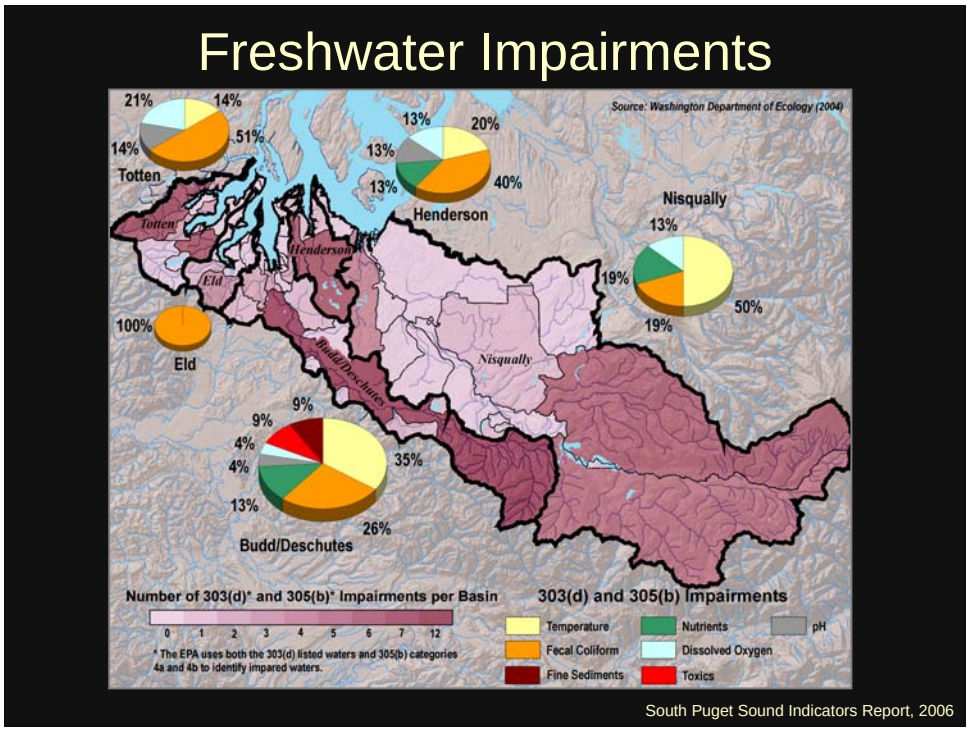
Moving to freshwater quality, as has been pointed out before -- and what's clearly one of the main themes of this presentation and the indicators report – the condition of our freshwater streams reflects the condition of the surrounding landscape. An important related point, however, is that practically no corner of the South Sound basin is immune to the imprint of human activity and related water quality problems.



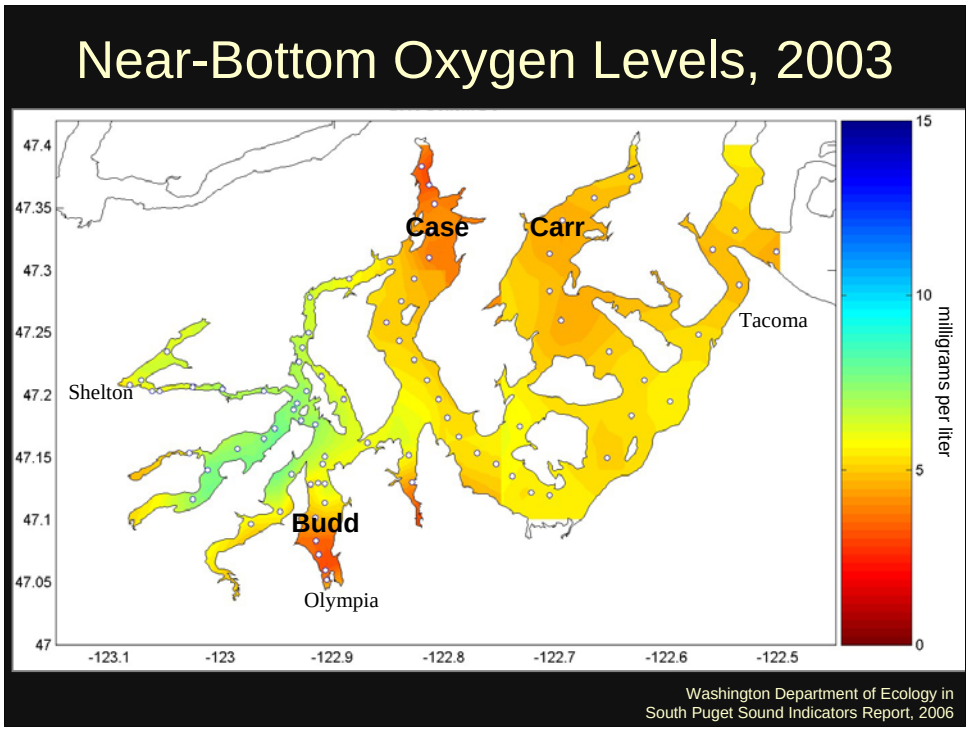
This figure shows that there are water quality problems across the region. The figure shows water quality violations – also known as impairments – that appear in the Department of Ecology's latest statewide water quality assessment (2004). The pie charts are sized to reflect the number of violations in each of the five watersheds and are segmented to show the different types of violations, and the map is shaded to show the number of violations in each sub-basin (the darker the shading the more violations). Ecology is currently working with various interests to develop and implement water cleanup plans to address these issues in all five watersheds.

Marine Water Quality

- Dissolved oxygen key vital sign.
- South Sound vulnerable to low dissolved oxygen.
- Nutrient inputs are priority issue, need attention.

Randy Shuman, King County DNR

And the final indicator is marine water quality. Although a variety of measures are used to gauge marine water health, arguably the most significant vital sign is dissolved oxygen – the level of oxygen that is dissolved in the marine water column and that sustains virtually all marine life. Most people have heard about the serious concern regarding low dissolved oxygen levels in Hood Canal, but how many have heard the same concerns regarding South Sound waters? The truth is that South Puget Sound is vulnerable to low levels of dissolved oxygen due to a combination of natural oceanographic factors and nutrient inputs associated with the region's development and large and fast growing population.



This figure shows near-bottom dissolved oxygen (DO) levels in South Sound as measured by the Department of Ecology in fall 2003. DO levels in the orange to red hues – below about 5 milligrams/liter (mg/l) – are a serious concern (minimum state marine standards are generally 6 to 7 mg/l). Ecology reports that the dead-end inlets of South Sound, such as Budd, Case and Carr inlets, are most susceptible to low oxygen levels and are most sensitive to increased nutrient inputs that can fuel short-term blooms of plankton and longer term enrichment of the system.

Conclusions

- Growth trends present serious challenges.
- Health of water resources is mixed – tend to mirror watershed conditions.
- Need to ramp up efforts to match scale of problems.
- Need greater focus on watershed protection, pollution prevention, education.

Added together, the indicators tell us that we have a number of serious challenges that will require unending attention and related investments. The good news is that there are many positive signs and opportunities to protect and restore the region's valuable watersheds and water resources, and these resources are still in pretty good shape in many places.

If we were dealing with an unchanging situation, the work would be challenging enough, but the region's fast growing population and urbanizing landscapes create a 'headwind' with virtually all of the issues, underscoring the importance of scaling up our efforts to match the scale of the problems. The report also highlights the fact that we're not dealing with a simple, one-dimensional pollution problem, but a more complex situation that require thoughtful attention on a number of fronts, including work to protect forest cover, minimize impervious surfaces, limit shoreline armoring, prevent pollution and educate the people of the region to help everyone better understand the issues and their role as stewards of South Puget Sound's valuable water resources.

For more information, visit the Puget Sound Action Team's website at www.psat.wa.gov or contact Stuart Glasoe of the Action Team at sglasoe@psat.wa.gov or 725-5449.